Strategic Aeronautics, Inc.

Multi-function, Multi-mode Digital Avionics Relevant Standards and Working Groups Survey

ACAST Workshop

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Topics

- **MMDA Definition**
- **Project Task**
- **Survey Context**
- **Surveyed Organizations & Committees**
- **Recommendations**

Definition

- **What is Multi-function, Multi-mode Digital Avionics?**
  - **Multi-function: Multiple C, N, or S functions performed either sequentially or simultaneously**
    - **Example: VDL communications, GPS-based navigation, and/or ADS-B transmissions**
  - **Multi-mode: Two or more operational modes of a given C, N or S function performed sequentially**
    - **Example: Communications via either VHF analog voice mode or VDL Mode 2**
  - **Digital Avionics: Onboard aircraft electronics hardware and software that are either software defined or re-configurable for multiple functions and/or modes of operation**

Project Task

- **Identify and summarize the goals and status of existing and emerging standards and working groups relevant to:**
  - **Multi-function Multi-mode Digital Avionics (MMDA)**
  - **Software-defined and/or software reconfigurable avionics capabilities**
  - **MMDA technologies**
  - **MMDA certification methodologies**

Survey Context

- Capability to get MMDA products certified is essential for commercial fielding of the product
  - Initial design should provide path to certification
- GRC intends to participate in standards bodies that affect MMDA
- Purpose of participation
  - Be aware and influence MMDA standards
  - Provide knowledge to effectively guide ACAST avionics and software development
    - Comply with standards
    - Design include path to eventual certification
- Context guided committee selection and recommendations

MMDA Related Organizations

- **Organizations that develop MMDA standards**
  - **RTCA**
  - **Airlines Electronic Engineering Committee (AEEC)**
  - **Object Management Group (OMG)**
  - **Society of Automotive Engineers (SAE)**
  - **American Institute of Aeronautics and Astronautics (AIAA)**
  - **Institute for Electrical and Electronic Engineers (IEEE)**

Committee Focus

Organization	Committee	Standards Focus
RTCA	SC-200 – Modular Avionics	Modular avionics
RTCA	Potential Special Committee on Software Certification	Certification criteria for software
AEEC	Systems Architecture and Interfaces Subcommittee	Airborne electronic equipment (including avionics) used in commercial, military and business aviation
AEEC	Application/Executive (APEX) Working Group	General-purpose APplication/EXecutive interface between an avionics computer OS and the application software
AEEC	ARINC 629 Users Group	Multi-transmitter data bus: transfer of digital data between avionics system elements using multiple access, bi-directional protocol
AEEC	Cockpit Display Systems Interfaces Working Group	Cockpit display system capabilities and interfaces between display systems and other related aircraft systems
AEEC	Joint GPS/XLS Subcommittee	Avionics that use the signal-in-space provided by Global Navigation Satellite Systems (GNSS) for aircraft navigation

Committee Focus

Organization	Committee	Standards Focus
AEEC	Surveillance Working Group	Integration of similar surveillance and Airborne Collision Avoidance System/Air Traffic Control (ACAS/ATC) systems
OMG	Middle and Related Services Platform Task Force	Object-oriented and message-oriented request broker technology and pervasive services for multiple middleware platforms. CORBA related capabilities.
OMG	Real-time, Embedded, and Specialized Systems Platform Task Force	OMG technologies that apply across domains for real-time, embedded, and related specialized kinds of systems.
OMG	Software-Based Communications Domain Task Force	Software technology targeted for software-defined communication devices.
OMG	Transportation Domain Task Force	OMG concepts and products to support a worldwide ATC standard infrastructure.
SAE	Aircraft Instruments, Committee A-4	Mechanical, electromechanical, and electronic cockpit instrumentation for civil aircraft, with emphasis on minimum performance standards intended for reference in FAA Technical Standard Orders (TSO).

Committee Focus

Organization	Committee	Standards Focus
SAE	Aircraft Systems & Systems Integration, Committee AS-1	Stores interface, validation requirements, systems integration, mission store validation plans and media terminal design. System test requirements, architecture, security and 1553 data bus standards.
SAE	Embedded Computing Systems, Committee AS-2	Philosophy, requirements, definitions, and user issues associated with embedded computing systems.
AIAA	Software Systems Technical Committee	Aerospace software development, productivity, reliability, maintainability, cost, and effectiveness.
IEEE	Portable Applications Standards Committee (PASC)	Application service interfaces - most notably those in the **P**ortable **O**perating **S**ystem **I**nterface (POSIX) family.

Involvement Recommendations

- **Criteria for recommending level of involvement**
  - **High Level**
    - **Committee addressing technologies and procedures that are state-of-the-art and directly impact MMDA product design**
    - **Committee is active**
    - **GRC's participation could have an impact on the composition of the standards**
  - **Medium Level**
    - **Committee addressing more stable technologies that can either directly or indirectly impact the design of MMDA products**
    - **Committee is active**
    - **GRC's participation could have some impact on the standards**

Involvement Recommendations

- Criteria for recommending level of involvement
  - Low Level
    - Committee is addressing basic technologies
    - GRC probably would not have an impact on the standards; e.g., POSIX standard
    - Dormant committee or one that will soon terminate
      - » ARINC 629 Users Group
      - » AIAA Software Systems Technical Committee
      - » RTCA's Modular Avionics committee (SC-200)

Involvement Recommendations

Involvement	Priority	Committee
H	1	OMG: Software-Based Communications Domain Task Force
H	2	OMG: Middle and Related Services Platform Task Force
H	3	OMG: Real-time, Embedded, and Specialized Systems Platform Task Force
H	4	AEEC: Application/Executive (APEX) Working Group
H	5	AEEC: Surveillance Working Group
H	6	AEEC: Systems Architecture and Interfaces Subcommittee
M	7	SAE: Aircraft Systems & Systems Integration, Committee AS-1
M	8	SAE: Embedded Computing Systems, Committee AS-2
M	9	AEEC: Joint GPS/XLS Subcommittee
M	10	RTCA: Potential Special Committee on Software Certification
L	11	AEEC: Cockpit Display Systems Interfaces Working Group
L	12	SAE: Aircraft Instruments, Committee A-4
L	13	OMG: Transportation Domain Task Force
L	14	IEEE: Portable Applications Standards Committee (PASC)
L	15	RTCA: SC-200 – Modular Avionics
L	16	AEEC: ARINC 629 Users Group
L	17	AIAA: Software Systems Technical Committee

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